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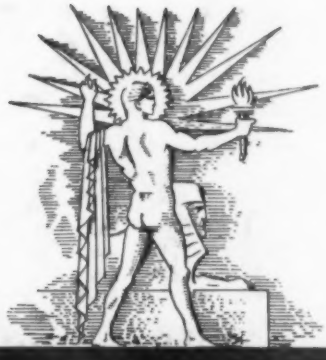
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



December 31, 1938

Chilled Goblet

See Page 423

A SCIENCE SERVICE PUBLICATION

Do You Know?

Cream-colored blackboards are being used in some schools to brighten the rooms.

The Pasteur Institute of Paris celebrated its fiftieth anniversary in November, 1938.

The historian Herodotus described cotton as a kind of wool that grew on wild trees in Indian.

In the slash-pine region of the South, beef cattle production offers a supplement to timber growing.

A laboratory for study of cosmic rays will be built by Soviet scientists on Europe's tallest peak, Mount Elbruz.

There are 101 recognized substances in milk, but no chemist has succeeded in putting them together and getting—milk.

Eight skilled WPA workers are turning out supports, belts, and braces for invalids on relief, at a New York hospital.

A compound made from peanut oil appears promising as a poison for control of leaf-eating insects, without harming foliage.

A psychologist finds that between 12 and 15 years girls change in their views of what are "good personality" traits, shifting from approval of quiet traits to more aggressive ones.

QUESTIONS DISCUSSED IN THIS ISSUE

Most articles which appear in SCIENCE NEWS LETTER *are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.*

ARCHAEOLOGY

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ASTRONOMY

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PHYSICS

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PSYCHOLOGY

What action has been taken by psychologists with regard to German persecution of the Jews? p. 422.

What causes nervous breakdown? p. 420.

PUBLIC HEALTH

Will America be healthy in 1939? p. 424.

Buff color gets its name from the buffalo, and originally buff referred to the soft light leather of chamois type used in soldier's uniforms.

A naturalist who studied the cone of Old Faithful Geyser in Yellowstone Park concludes that the famous geyser is only a few hundred years old.

Sand dunes in the White Sands National Monument, New Mexico, are moving toward the town of Alamogordo 18 miles away—but at the rate of only eight inches a year.

Wisconsin is winding up the largest program of game-bird propagation in its history, and possibly the largest of its kind in the world.

A government scientist says that the hairs on a tomato plant are really spines which secrete a gum-like substance, tangling the feet of insects.

Radio beacons in Central American waters will soon be operated according to the uniform system, whereby such beacons in America are kept from interfering with one another.

SCIENCE NEWS LETTER

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GENERAL SCIENCE

Faith Important in Science As Intuition and Reason

Retiring President of American Association Gives The Articles of His Personal Scientific Faith

FAITH is as important in the pursuit of scientific knowledge as intuition and reason, while "today the significance of science as a principal source of revelation is almost universally recognized."

This was the essence of the message of Dean George D. Birkhoff, Harvard's leading mathematician. As retiring president of the American Association for the Advancement of Science, Dean Birkhoff delivered the principal address.

"In the daring effort of the scientist to extend knowledge as far as possible," Dean Birkhoff declared, "there arises an aura of faith. It is this spontaneous faith that furnishes the most powerful incentive and is the best guide to further progress."

By faith Dean Birkhoff explained that he means "those heuristically valuable, more general points of view, which are beyond reason, and sometimes in apparent contradiction with one another, but which to the individual concerned seem of supreme importance as he endeavors to give his conclusions the widest possible scope."

Making a strong plea for an essentially religious attitude toward the problems of science and society, Dean Birkhoff announced the articles of his personal scientific faith:

1. It is desirable to accord reality in equal measure to all kinds of knowledge everywhere, and so to view the universe as broadly and impartially as possible.

2. In order to understand the various facts and their interrelations we must always use abstractions, that is, conceptual tools of a logical or mathematical nature.

3. The transcendent importance of love and goodwill in all human relations is shown by their mighty beneficent effect upon the individual and society.

Anyone is free to agree or disagree with these articles of faith, Dean Birkhoff emphasized, because they are not verifiable experimentally or strictly demonstrable. In opposition to his belief that the levels of knowledge are to be taken as equally real, he states that there might be set the opposing belief that every fact is ultimately expressible in purely physical terms.

Dean Birkhoff presented to his scientific audience a "mind-nature spectrum," containing five ascending levels, mathematical, physical, biological, psychological and social. Each of these levels has its appropriate special language, Dean Birkhoff explained, and the basic concepts are number at the mathematical level, matter at the physical level, organism at the biological level, mind at the psychological level, and society at the social level.

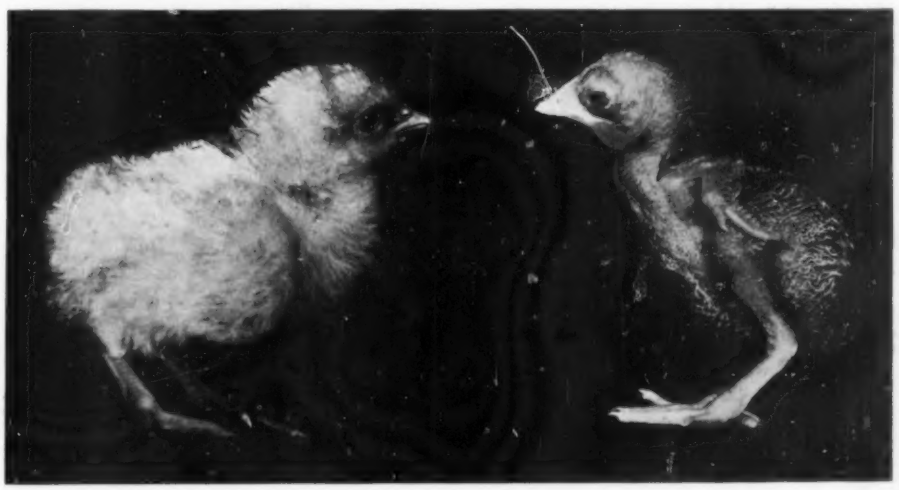
"If we choose to select one of these as somehow more real than the others, a great distortion arises in our point of view," he said. "For instance, if we regard the physical level as the most fundamental, we become materialists. But why make such an unnecessary choice? The languages of the various levels are essentially independent of one another, and the observed laws are best expressed in their own natural terms. Why mix up the levels of knowledge unnaturally? Does it clarify our idea of social justice to try to explain it in terms of the reactions between protons and electrons in the brain?"

As an example of the intimate relationship between philosophical-scientific viewpoints and actual advances in theoretical physics, Dean Birkhoff cited Einstein's gravitational theory of 1915.

He explained that Einstein took as his starting point the reasonable hypotheses that matter must condition space and time, and that, in parts of space remote from matter, elementary particles move with uniform velocity in a straight line. Einstein arrived at his field equations as the most elegant mathematical embodiment of these ideas. Thus there was obtained a quasi-geometrical theory of gravitation which in certain respects is more natural than the celebrated theory of Newton, while the predicted differences although excessively minute are in favor of the new theory. But Dean Birkhoff believes that Einstein's theory cannot be regarded as true in any absolute sense since it gives us at best a partial, highly idealized view of the physical universe.

The origin of life may be explained by the fact that chemical experiments upon large organic molecules such as are present in disease viruses, seem to indicate "an innate hospitality of actual matter toward the evolution of the living organism," Dean Birkhoff explained. But this, he explained, "can scarcely be called mechanistic." But he does believe it seems possible that we are on the verge of further refinements in our concept of matter.

A plea for further unification of the



NAKED CHICKENS

Oddly undressed chicks like the one at the left have appeared in a flock studied by Drs. F. B. Hutt and P. D. Sturkie of Cornell University and reported on in the Journal of Heredity. During adolescence they become even nakeder. Only at maturity do they grow a few feathers.

whole scientific world to promote better understanding among men was voiced by Dean Birkhoff in closing his address.

Nervous Breakdown Cause

DIFFICULT problems will not drive you crazy, even if they are completely unsolvable, provided you are not forced to find an answer. Men suffer from nervous breakdown when they are driven by circumstances to take some action but still can find no way to turn, it was concluded by Dr. Norman R. F. Maier, of the University of Michigan from research reported to the American Association.

"Pregnancy and the conflicts arising from sin contribute greatly to neurotic behavior by leaving no avenue for behavior and yet requiring that something be done," Dr. Maier said.

On the other hand, going to the electric chair, while it may produce tensions, does not produce neurosis because the individual knows just what he must do.

Dr. Maier's experiments were conducted with rats that had been taught by reward and harmless punishment to distinguish between two cards. Then, instead of being permitted a choice, the animal was shown only one of the cards and yet was forced to act by a blast of air. At sight of the "punishment" card, the rat might resist action for as long as 15 minutes before he would jump.

Neurotic symptoms resulted. The animals would tear out of the apparatus, run in circles on the floor, show intense tics, and then varying degrees of coma.

The cure for human patients, Dr. Maier indicated, seems to lie in the direction of finding a way for the patient to act.

Maze Test Clue to Learning

THREADING with a pencil a complicated maze, 60 human subjects have led to a revision in the psychologist's general theories of learning.

The experiment was described by Dr. John A. McGeoch of Wesleyan University.

When his subjects had once found the correct path that would lead them successfully through the maze, they could repeat it at will, but their individual movements in threading it might vary with each trip.

The learning, Dr. McGeoch concludes, was not of a stereotyped set of movements. Instead, the student learned how to cover a general route and reach a certain goal.

A similar situation perhaps exists when you go into a strange town and learn the location of the post office. You may then be able to reach it by traveling any of a number of streets.

Psychologists, in their thinking about learning, Dr. McGeoch indicated, must take into consideration a factor which is in the nature of a "set", or readiness, to go in a certain direction at a certain point in the activity regardless of the specific acts along the way.

"We know little of its specific character," he said, "but as a useful construct it seems to be required."

Science News Letter, December 31, 1938

ASTRONOMY—PHYSICS

Nova Star Splits Into Three; May Be Creation of New World

Two Parts Are On Their Way Rushing Out Into Interstellar Space; Observed in South Africa

THROUGH telescopes in Java and in South Africa astronomers are now watching a giant stellar explosion which may be producing new worlds.

This exploding star, known as Nova Pictoris to astronomers, has been split up into three sections which are flying apart at speeds of over a million miles an hour.

Calculations of the energies needed to bring about this stellar explosion were reported to the American Physical Society in Washington, D. C., by Dr. Ross Gunn of the U. S. Naval Research Laboratory.

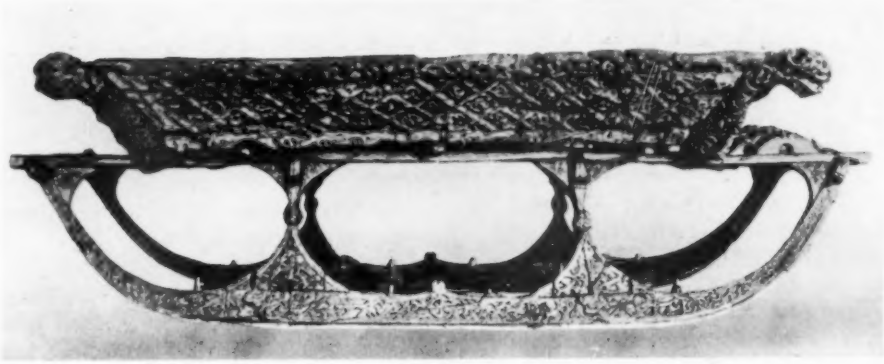
Through telescopes in the southern hemisphere Nova Pictoris looks like three tiny pin-points of light close together. The largest of the three parts has a mass 86 per cent. of that of the sun and the two smaller parts have masses 34 and 30 per cent. respectively of the sun's mass.

At last measurement the small parts were about three light years away from the larger part and moving rapidly to still greater distances. A light year is the distance light travelling at 186,000 miles a second will travel in a year. In distance a light year amounts to 6,580,000,000,000 miles.

The speed of recession of the small

ARCHAEOLOGICAL JIGSAW

In the grave of Queen Aase at Oseberg, Norway, were found 1,068 pieces like these. Prof. A. W. Brogger tells how University of Oslo scientists dug the pieces out from where they had been since 850 A.D. and boiled each scrap in alum and lacquered them with linseed oil to prevent shrinkage.



SUCCESS

When the archaeologists had painstakingly put together all the fragments shown on the facing page, they had this Viking sleigh.

parts from the parent is about 540 kilometers a second or well over a million miles an hour.

Such speeds, Dr. Gunn points out, are over 300 times the needed critical velocity to enable the receding parts to fly out from the gravitational field off into space. The two parts of Nova Pictoris, therefore, are on their way out into the depths of interstellar space and eventually will be lost from the larger part.

This situation is comparable to Dr. Gunn's hypothesis of the origin of our own solar system. He believes that in Nova Pictoris even now very small pieces may be thrown off from the original masses and become planets.

Dr. Gunn has suggested that the splitting of some large star created our sun, the planets and at least one additional, but now missing, star which originally was part of the sun's parent.

As the sun's original parent star split up, its two huge parts started whirling around one another and, at the same time, started to separate. Due to mutual gravitational forces the two parts created enormous tidal waves on each other. These waves tossed off what might be called "spray" that flew off into space and eventually became the planets when the pieces cooled.

Nova Pictoris, Dr. Gunn states, has the luminosity of the usual nova type star. While it is far brighter than most common stars its brilliance is still far less than the so-called "super" nova stars.

Yet mere brightness of a nova star is not the sole criterion of the energy which is liberated in the explosion that called it into being, maintains Dr. Gunn.

Nova Pictoris, in fact, furnished an excellent example of a star that liberated an enormous amount of energy and yet did not attain super brightness. The reason is that much of its liberated energy went into scattering its three great masses off into space. What was left over appeared as light.

The total energy to do all this, Dr. Gunn calculates, is just about the same order of magnitude as is the energy liberated by the so-called "super" nova stars.

All this means that the difference between a nova and a super nova star may well be only in the distribution of the liberated energy and not because some different cataclysm occurred to create super nova stars.

Dr. Gunn's report, in this respect, differs from the hypothesis of Drs. Fritz Zwicky and Walter Baade, of California Institute of Technology and Mt. Wilson Observatory, who have suggested special kinds of stellar explosions to account for super nova stars.

Cosmic Rays Discussed

COSMIC ray day at the meetings of the American Physical Society was marked by reports of studies of these piercing, baffling radiations from outer space.

1. Cosmic ray electrons entering the earth's atmosphere have energies greater than 2,000,000,000 electron volts.

2. The development of automatic apparatus to record the "showers" of atomic debris caused by cosmic rays striking materials on earth.

3. Improved apparatus for determining cosmic ray intensities high in the atmosphere during robot stratosphere balloon flights has been developed.

4. No observed difference between day and night cosmic ray intensity at high altitudes.

5. Measurements of the "life" of the heavy electron (mesotron) particles that show they last only a few millionths of a second.

Prof. R. A. Millikan and Dr. H. V. Neher of California Institute of Technology reported the results of 10 new balloon flights almost to the top of the earth's atmosphere which give a lower limit of energy for cosmic ray electrons as 2,000,000,000 electron volts.

The automatic "shower" records were described by Dr. W. F. G. Swann and Dr. W. E. Ramsay of Bartol Research Foundation of the Franklin Institute, while National Bureau of Standards scientists Drs. L. F. Curtiss, A. V. Astin, L. L. Stockmann and B. W. Brown told of their improved recording circuits devised for studies of cosmic ray intensities at high altitudes.

In papers with Drs. S. A. Korff and M. A. Pomerantz, Dr. Thomas H. Johnson, assistant director of the Bartol Research Foundation, described high altitude attempts to find a night-day difference in cosmic ray intensity and experiments on the absorption of the mesotron particles in air and lead which indicate new estimates of the "life" of these new-found atomic particles.

Cancer-Causing Chemical

A NEW biological method of detecting the presence of the cancer-causing chemical methylcholanthrene, 100 times more sensitive than any previously known, was reported by Drs. Alexander Hollaender and Peter A. Cole of the Washington Biophysical Institute, National Institute of Health.

The new studies, under way only six months, have already been applied to study the lethal effect of methylcholanthrene on living things. The killing of yeast cells by the chemical in the presence of ultraviolet light has been accomplished. For the future lies work on experimental rats and—if continued work shows present promise—eventually on human beings.

The new method, a biological one, may supersede previous tests in detecting methylcholanthrene which have made use of the fluorescent and absorption spectrum of the chemical. By the biological method concentrations of methylcholanthrene to only one part in a billion can be detected. Fluorescent spectrum methods of detection can spot concentrations of methylcholanthrene of one part in ten million.

In their studies the National Institute of Health scientists placed colonies of yeast cells in test tubes containing physiological salt solution. To this they added

small, known amounts of methylcholanthrene.

When these test tubes were radiated with ultraviolet light large numbers of yeast cells were destroyed overnight. Similar tubes, containing equal amounts of methylcholanthrene but not radiated with ultraviolet light, showed a stimulating growth to the yeast cells when left over night. Care was taken to see that the ultraviolet light used was not itself capable of destroying the yeast cells.

It is impossible to say whether methylcholanthrene caused cancer in the yeast cells, said Dr. Cole in an interview. Certainly the combination of ultraviolet light and methylcholanthrene killed the cells, but it seems possible that the lethal effect was a photochemical one.

Such a hypothesis might also explain surface cancers in animals and in man. But it is difficult to see how photochemical effects could create internal cancers, reports Dr. Cole.

Large numbers of yeast cells are used in the study so that the lethal effects can be worked out on a statistical basis and high accuracy attained.

Describing future work, Dr. Cole said:

"While our work has been done only on yeast cells, the increased sensitivity of the method suggests that it might be useful in animal experimentation on rats and perhaps, eventually, on humans. If such future work is done it would be to detect methylcholanthrene in the blood serum."

Science News Letter, December 31, 1938

MEDICINE

Hay Fever Successfully Treated with Potassium

THE SUCCESSFUL treatment of hay fever with potassium salts is given a preliminary report by Dr. Benson Bloom of Tucson, Ariz. (*Journal, American Medical Association,* Dec. 17.)

Striking benefit was obtained by 29 patients given potassium chloride, Dr. Bloom reports.

The method is simple and no complications or "side effects" were noted, although further studies are indicated, he declares.

These salts also were successfully used by Dr. Bloom in treating several cases of urticaria (hives), eczema, nasal polyposis, chronic allergic sinusitis and migraine.

In cases of chronic asthma the same treatment helped not at all

Science News Letter, December 31, 1938

PSYCHOLOGY

Psychologists Protest Nazi Persecution of Jews

DECLARING that no conclusive evidence has been found for racial or national differences in either intelligence or personality, psychologists issued an official protest against the "non-scientific interpretations" of racial psychology which "Fascists are using to justify persecution." These theories have been developed, they said, not on basis of fact but under domination of powerful emotion.

Prepared by psychologists who are specialists on racial psychology after a survey of scientific investigations in this field, the protest was issued officially by the Council of the Society for the Psychological Study of Social Issues.

"There is no evidence for the existence of an inborn Jewish or German or Italian mentality," the statement declares. "Furthermore, there is no indication that the members of any group are rendered incapable by their biological heredity of completely acquiring the culture of the community in which they live. . . .

"The Nazi theory that people must be related by blood in order to participate in the same cultural or intellectual heritage has absolutely no support from scientific findings."

Members of the Council are: Dr. F. H. Allport, Syracuse University, Dr. Gordon Allport, Harvard University, Dr. J. F. Brown, Kansas University, Dr. Hadley Cantril, Princeton University, Dr. L. W. Doob, Yale University, Dr. H. B. English, Ohio State University, Dr. Franklin Fearing, University of California, L. A., Dr. George W. Hartmann, Columbia University, Dr. I. Krechevsky, University of Colorado, Dr. Gardner Murphy, Columbia University, Dr. T. C. Schneirla, New York University, and Dr. E. C. Tolman, University of California.

Science News Letter, December 31, 1938

GEOLOGY

Earth's Magnetic Forces of Ice Age Epoch Determined

RECORDS of the earth's magnetism back in the ice ages, thousands of years ago, have now been traced out by scientists at the Carnegie Institution of Washington, it was reported to the Philosophical Society of Washington.

A. G. McNish and E. A. Johnson described how new and delicate apparatus makes it possible to discover that the magnetic north of the compass in that long past era was about 60 degrees west of where it is today. The magnetic north pole of the earth was then somewhere on a line between Edmonton, Alberta, and New York City instead of in the neighborhood of Hudson Bay.

The records of the earth's past magnetism have come from sedimentary layers laid down in the ice age, said the scientists. These layers consisted of silt that dropped to the bottoms of ancient streams and lake beds. Particles of magnetic materials in the silt fell so that their magnetic properties were oriented with the direction of the earth's magnetic field at that particular time.

Finally, as the sedimentary material turned to clays and stone, the magnetic particles became embedded and fixed in position and have remained so, in general, since that time.

What was needed to make the discoveries was a delicate instrument which could measure the magnetism of samples of these ancient deposits.

Science News Letter, December 31, 1938

MEDICINE

Severe Liver Damage From Sulfanilamide

FIVE cases of severe liver damage resulting from treatment with sulfanilamide, new chemical remedy used for a wide variety of germ diseases, are reported by Dr. Curtis F. Garvin of Cleveland to the American Medical Association. (*Journal of American Medical Association,* Dec. 17.)

A case of definite sensitization to the new drug is also reported by Dr. E. B. Rogers of El Paso, Tex.

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IN SCIENCE FIELDS

GEOLOGY—ZOOLOGY

Beavers Pointed Out As Important Geologic Forces

BEAVERS got into the news in a big way, not so long ago, when soil conservation workers planted them in Western valleys where their dams would check the erosional appetites of tumbling streams.

But it's all an old story to the beavers, Dr. Rudolph Ruedemann and W. J. Schoonmaker of the New York State Museum point out. (*Science*, Dec. 2) Their field studies indicate that for thousands of years these dam-building animals have been acting as important geological forces, not only in slowing down the erosion of soil but in actually building it up. Many of the flat-floored creek and small river valleys in the East, sites of some of the most prosperous farms, represent filled-up ancient beaver ponds.

Science News Letter, December 31, 1938

ARCHAEOLOGY

Harpist Found in Art In Armageddon Ruins

A CRUDE sketch of a woman twanging the strings of a harp has been found in the pavement at Armageddon in Palestine, in a layer of ruins that date from before 3000 B. C.

That the harp is an old instrument, of course, has long been known. In the Bible, the harp is mentioned more than forty times. When David played the harp to quiet the harassed mind of King Saul, he was making music in a manner that was then several thousand years old.

Harps have been pictured in Egyptian art of about 3000 B. C. Harps of gold, silver, and lapis unearthed at Ur of the Chaldees are as beautiful in their way as the gold piano that has just been transferred from the White House in Washington to the National Museum. The harps of Ur were played a few centuries prior to 3,000 B.C. and they must have been preceded by more primitive types.

Armageddon's pictured harp is, therefore, not the world's oldest. But it is the oldest evidence of harps in Palestine. It shows that long before the Israelites marched in to conquer the Promised Land, the harp was played there by early inhabitants, ancestors of the peoples who figure vaguely in Old Testament narrative as idol-worshipping enemies who were present in the land.

The harpist is a discovery at Megiddo, or Biblical Armageddon, by archaeologists of the Oriental Institute of the University of Chicago. The strategic fort-town which overlooked many battles is known now to have been built and re-built twenty times. Nineteen layers deep, the archaeologists found the rock pavement on which some unknown artist recorded impressions of life in his day, including pictures of dancers or warriors—it's not too clear, which—and a variety of animals, and the lady with the harp.

Science News Letter, December 31, 1938

PHYSIOLOGY

Calcium Lack Linked With Paralysis in Animals

CALCIUM deficiency, all too common a fault in human diets in America, has for the first time been linked with certain types of paralysis in animals.

Possibly akin to certain brain hemorrhages in man, this paralysis is of hemorrhagic origin, it is pointed out in the report of the research issued by the University of California.

Collaborating in the research were the following University of California scientists: Dr. David M. Greenberg, Muriel D. D. Boelter, and Dr. Benjamin W. Knopf.

Too little calcium in the blood has already been identified as cause of tetany, a convulsive disorder not to be confused with tetanus infection or lockjaw. Paralysis, however, has not heretofore been attributed to a deficiency of calcium, despite the fact that it has been observed often in nature among browsing animals.

Calcium is said to be the substance most commonly lacking in the American diet. Good food sources of it are eggs, beans, milk, cheese and almonds.

Science News Letter, December 31, 1938

MEDICINE

Sulfanilamide's Effects Related to Type of Injury

HOW sulfanilamide does its amazing work in relieving certain disease conditions and why it sometimes fails or brings unpleasant reactions, are questions that must be answered before use of this new drug can be put on a rational basis for the treatment of human beings.

An important next step in this direction is reported by Drs. John S. Lockwood, Alvin F. Coburn and Herbert E. Stokinger of Columbia University College of Physicians and Surgeons. (*Journal, American Medical Association*, Dec. 17.)

The effectiveness of sulfanilamide is related more to the character of the lesion or injury done by germs than to the identity of the bacterial infection, they find. Sulfanilamide's most striking aspect in treatment is a depression of the invasive properties of the micro-organism causing the disease conditions, these scientists state.

This effect is definite within 18 hours in the case of bacteria circulating in tissue fluids or in newly invaded tissues.

However, in tissue already broken down, effectiveness is lost.

It is not known whether the debris itself in the broken-down tissue protects the harmful organisms or whether the drug cannot penetrate sufficiently into the tissue when debris is present.

Science News Letter, December 31, 1938

PHYSICS

Double-Walled Goblet Contains Liquid Air

See Front Cover

NO TOAST to New Year's is the cover picture of SCIENCE NEWS LETTER this week. The "steaming" goblet is really a form of Dewar flask containing liquid air whose chilling temperature of 313.6 degrees below zero Fahrenheit has caused frost to form on the mouth of the vessel. Roses dropped into the liquid air are quickly frozen solid and become so brittle that the slightest touch will shatter them.

Science News Letter, December 31, 1938

PUBLIC HEALTH

Banner Year for Health

No Major Epidemics in 1938, and 8,000 Lives Saved From Auto Accidents; Continued Health in 1939

By DR. LOUIS I. DUBLIN, Third Vice-President and Statistician Metropolitan Life Insurance Company

A YEAR ago, in a similar statement for Science Service, I said that the health outlook for 1938 was altogether favorable. This prediction was based on the remarkable health record established for 1937 among the many millions of persons who were Industrial policyholders of the Metropolitan Life Insurance Company. My optimism was more than justified, for no previous year has even closely approached the record for low mortality established for 1938. Month after month, the death rates among these insured wage-earners and their families have been even lower than during 1937, and at the middle of December we find a year-to-date death rate that is over 7 per cent. below the previous minimum, as established only a year since.

What happens among these many millions of people is a pretty sensitive index of health conditions in the country, as a whole. So, even if I had no other source of information I could say that 1938 has been an extraordinary health year in the United States. But, as a matter of fact, information for the first nine months of the year is available from the health officers of 39 States. The story they tell is that without a single exception, every one of these States has shown improved mortality as compared with 1937 — and in many instances very marked improvement. It is thus practically certain that 1938 will be acclaimed the banner health year in the history of our country.

The principal factors in bringing about this favorable situation were the much lower mortality rates this year from diseases affecting the respiratory system, namely, pulmonary tuberculosis, influenza, and pneumonia, and the gratifying accomplishments of the campaign to reduce the shameful toll of automobile accidents.

New Low Records

The death rates from tuberculosis, pneumonia, and influenza have reached new minima for the United States during 1938. It is almost certain that the mortality from tuberculosis for the country as a whole will drop below 50 per 100,000 for the first time in history. If the present rate of decline continues for a few more years tuberculosis will reach the stage where the number of open cases will no longer be sufficient to maintain it among the leading causes of death in this country. There has been no more striking instance of the success of the public health movement than the decline in the tuberculosis death rate during the last four decades. The time is now ripe for a final and intensified drive leading to the effective suppression of this disease.

There were no major epidemics of influenza or pneumonia in 1938. In the case of pneumonia, there was also the added factor, no doubt, of the wide adoption of the new serum treatment against the more prevalent types of pneumococcus. By placing these serums at the disposal of practising physicians, an increasing number of States are materially reducing the fatality rate in pneumonia cases.

Inasmuch as respiratory disease tends to hasten the deaths of persons suffering from cardiac, vascular, or renal conditions, a natural consequence was the fall in mortality from most of the chronic diseases of old age. The sole exception to this rule, in 1938, was the continuance of the rise in deaths charged to coronary artery disease. But this increase may be only apparent, reflecting improved diagnosis together with the newly awakened interest of physicians in this form of heart disease and an increasing tendency on their part to give coronary disease prominence as the chief cause of death when associated with other conditions.

Auto Deaths Lower

Among the most gratifying aspects of the mortality picture for 1938 was the marked decline in automobile fatalities. Evidently the very active crusade against careless driving which has been waged in all parts of the country in recent years is beginning to show results. Present figures indicate that the final tabulation will show fewer deaths by one-fifth from this cause than were recorded in 1937 and this will mean about 8,000 lives saved. Fatal occupational accidents, as well as those occurring in public places, likewise resulted in fewer fatalities this year, although accidents in the home appear to have been as numerous as those reported a year ago.

Further gains against both infant and maternal mortality also contributed to the salutary state of public health during the past year. It is safe to report new minimal death rates in both of these important fields of public health work.

Aside from the rise in mortality from coronary artery disease, about the only disturbing feature of the present mortality picture is the continued increase of the cancer death rate. The year 1938 is the twentieth consecutive year, with a single exception, to register a rise in this malignant form of human affliction. There is some doubt, however, as to whether this upward trend in cancer deaths actually marks an increase of the disease or merely reflects the rapid aging of our population. Since cancer is a disease that is confined largely to the later years of life it is certain that much of the apparent rise is attributable to the increasing proportion of old people in the general population. Improved means of diagnosis and more accurate reporting also have been important elements in the apparent increase in cancer mortality.

Fewer Infections

Turning to the sickness side of the subject we find a gratifying situation also. All but two of the leading communicable diseases showed below-normal prevalence during 1938. The country was especially blessed in that it was comparatively free of that scourge of childhood, poliomyelitis (infantile paralysis). Less than 1,700 cases were recorded throughout the entire country and no section has suffered what might be called a major outbreak.

Only measles and smallpox were unusually prevalent during the current year. Fortunately neither of them was responsible for much mortality, although the exceptionally low death rate from measles in 1937 was probably quadrupled in 1938.

The smallpox situation, however, cannot be passed over so lightly. The incidence of this loathsome disease has been steadily climbing during the last four years despite the fact that no scourge to which man is subject can be more easily

controlled. Close to 40 per cent. more cases of smallpox were reported in this country during 1938 than were registered in 1937. Luckily, the cases were of the so-called mild form of the disease, which causes few deaths. However, sooner or later, certain of those communities which continue to regard this mild form of contagion too lightly, will awake to find the more virulent type of smallpox raging in their midst with all its dire consequences. Why do these places persist in taking this serious risk when it can be avoided so easily by community-wide vaccination?

Will the present favorable health conditions continue during the coming year? In general, I think they will; but no such statement can be made without reservations and safeguards. So much depends upon the occurrence of major epidemics, weather conditions, and other "acts of God," that no one can now predict with reasonable accuracy the final outcome. No one can foresee such disastrous visitations as nationwide epidemics of disease, floods, droughts, earthquakes or prolonged periods of extreme temperature. Barring these, however, it is safe to say that 1939 will be another very favorable year in the health of the American people. I do not believe, however, that the unprecedentedly low influenza death date during 1938, will be maintained in 1939. That is too much to expect in the light of the past performance of this disease. If we have more influenza, we shall probably have more pneumonia, but even so, with wider use of serum therapy the mortality may still decline further.

Polio May Increase

It is reasonable to suppose that owing to the very low incidence of poliomyelitis this year, there will be some increase during 1939. On the other hand, measles, following its usual cycle, is almost sure to show a sharp decrease. Perhaps it is too much to hope for a decline in smallpox, but possibly the mounting incidence of the past few years will frighten enough people into being vaccinated to reduce materially the number who are susceptible to the disease. In that case some decline in the number of cases may be expected. Nothing at present indicates any unfavorable changes in the prevalence of the other important communicable diseases.

On the whole, the augury for the coming year is most propitious. At no time in the history of our country have there been so many signs of popular interest in public health affairs. The widespread and active campaign against venereal disease, the ambitious program advocated by the American Tuberculosis Association, and the successful National Health Conference at Washington in July, all emphasize the keen interest that is being manifested in communal and individual health.

With such evidence of public interest and support, it is needless to say that there will be no letup in the good work of the past. Rather, we can look forward to even more active and capable handling of our many health problems. All this moral and material backing is bound to benefit the work of our health departments, to encourage fruitful research work and to increase and improve the medical facilities available to the indigent and less fortunate members of society.

Not the least favorable aspect of the present movement is the whole-hearted response that has been received from the press and organized medicine. This makes it unanimous. There never has been a time when the health prospect seemed so auspicious. Barring unforeseen and uncontrollable acts of nature, 1939 should prove to be another milestone on the road to better health and longer life for our people.

Science News Letter, December 31, 1938

PHYSICS

Theories of Solar Energy Also Forecast End of World

CARBON, so vital to life on earth, is now revealed as the transmuting catalyst in the sun which makes it possible for hydrogen atoms to combine into helium and thus release the vast store of nuclear energy which makes the sun shine on and on through the ages.

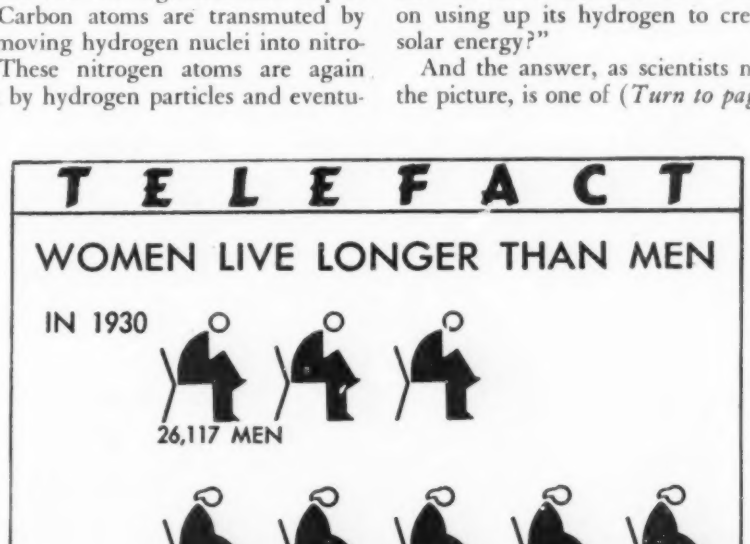
The Morrison Prize of $500 to Prof. Hans A. Bethe of Cornell University for the theory which produces this picture of the cause of solar energy brings public recognition to something which scientists have known for some time.

The details are ingenious and important. Carbon atoms are transmuted by swift-moving hydrogen nuclei into nitrogen. These nitrogen atoms are again struck by hydrogen particles and eventually create helium atoms and regenerate carbon atoms with the release of enormous energy. It is the hydrogen on the sun which is used up in the process, while the carbon content of the sun remains pretty much the same.

But many people will leave the intricate details of the process to the scientists and jump mentally onward to a most important question for all of man's descendants on earth in the millions of years to come.

That question is, "What happens to the sun and to the earth as the sun goes on using up its hydrogen to create the solar energy?"

And the answer, as scientists now see the picture, is one of (*Turn to page 427*)


TELEFACT
WOMEN LIVE LONGER THAN MEN
IN 1930
26,117 MEN
40,544 WOMEN 90 YRS. & OVER IN U. S. A.
A SCIENCE SERVICE FEATURE. Symbols © Pictorial Statistics, Inc., N. Y. C.

ASTRONOMY

Astronomers Can Predict

Celestial Happenings Can Be Foreseen Better Than Those On Earth; Four Eclipses Scheduled for 1939

By JAMES STOKLEY

IT IS, unfortunately, impossible to predict what is going to happen on the earth during the coming year, but there are some things which will happen in the sky, that we can foretell.

Not all celestial happenings are anticipated, however. For instance, no one knows when a very bright comet, rivalling the famous ones of the past, may come into our sky. Some of the most brilliant of previous years have been entirely unexpected.

Eclipses, however, can be foretold with great accuracy. There will be four in 1939, two of which will be seen from the United States.

The first will be on April 19, when the moon will come between the earth and the sun. This happens when the moon is rather more distant than average, so its apparent size will not be great enough to cover the sun. Hence, even where the eclipse is greatest, a ring of the sun's edge will remain visible, producing what is called an "annular" eclipse.

This ring effect will only be seen along a path across Alaska. Over Canada, and all the United States except the southern tip of Florida, there will be a partial eclipse, with the moon's disc partly covering the sun. The nearer the observer is to Alaska, the greater will be the eclipse.

May 3 is the date of the second eclipse. This is of the moon, and total, because the moon will then completely enter the earth's shadow. It will not, however, be seen from the United States, but the region of visibility will include Alaska, the Pacific Ocean, Australia, Asia, Africa and eastern Europe.

A total eclipse of the sun comes on October 12, when the moon will hide the sun for as much as a minute and a half. This would attract great astronomical attention were it not for the unfortunate fact that the region traversed by the moon's shadow, along which it will be seen, lies in the Antarctic, close to the South Pole. In the southern tip of Africa, and in southeastern Australia, it will be visible as a partial eclipse.

The last eclipse of the year is another of the moon, visible over all of North and South America, most of Europe, eastern Asia and Australia. It will not actually be total but more than 99 per cent. of the moon's diameter will be immersed in the earth's shadow, so it will be practically a total eclipse.

Of even greater interest than these eclipses during the year will be the planet Mars, for during the summer it will be closer than for centuries to come, or than it has been since 1924. In that year, on August 23, it was 35,000,000 miles from us.

Last July it was on the opposite side of the sun, a distance of 248,000,000 miles. On January first, its distance is 178,000,000 miles. During the year it draws closer and closer until, on July 27, it reaches the minimum distance of 36,024,300 miles, when it will shine with great brilliance in the night time sky.

Then, many observatories will make careful studies. Using new photographic material, and techniques developed since 1924, it is likely that important facts may be learned, some of which may have a bearing on the perennially interesting problem of possible life on this neighboring world.

During this month two bright planets have joined the stars which make glorious the January evening skies. In the early evening Jupiter can be seen in the west. Its brilliance exceeds any other star or planet now apparent, but it sets before the times for which the accompanying maps are drawn, namely, 10:00 p. m., January 1; 9:00 p. m., January 15 and 8:00 p. m., January 31. Saturn, however, which is fainter, is indicated in the figure of Pegasus.

In addition to Jupiter and Saturn, three other planets are visible to the unaided eye. These can all be seen this month in the early morning. Brightest of the trio is Venus, in the constellation of Scorpius, which appears in the southeast a few hours before the sun. The great brilliance of Venus leaves no doubt as to its identity. Higher, and farther south, in the constellation of Libra, the scales, Mars is visible, red in color and very much fainter. For a few days at the beginning of the month, Mercury will also appear very low in the morning twilight.

On January 14 the moon passes Mars, less than one lunar diameter to the south. The moon passes Venus on the 16th, Jupiter on the 23rd and Saturn on the 26th. On January 3, at 5:00 p. m., the earth is at perihelion, its nearest distance to the sun during the whole year.

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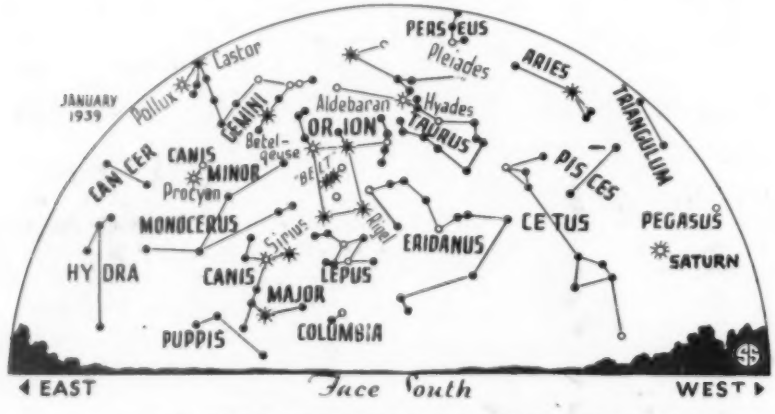

☼ ✷ ○ • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS

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flaming death for the earth, as contrasted with former pictures of the earth becoming colder and colder as the sun's energy diminishes.

True, the sun probably will become a cold body and hence the earth, too, will sink into an ultimate frozen state, which is known already to have overtaken other stellar objects.

But before that day comes, the sun is going to become much hotter than it now is and life on earth, as man knows it, will probably end. That forecast of the end of the world is an outgrowth of the theory of Prof. Bethe on the transmutation of hydrogen into helium on the sun as the cause of solar heat and radiant energy.

Prof. George Gamow at George Washington University ten years ago worked out the theory of nuclear transformations which made it possible to calculate exactly the rate of energy liberation due to the transformation of the elements at the enormous temperatures of several million degrees existing inside stars and particularly inside the sun.

In recent work Prof. Gamow has extended his studies to include the evolution of stars as they transmute their hydrogen into helium atoms. The main result of the constantly decreasing hydrogen content, it is pointed out, is to increase the luminosity of such stars and to increase their outpouring of energy.

Prof. Gamow estimates that the sun at the present time consists of about 60 per cent. hydrogen. Most important, the sun is bound to become about 100 times brighter than it is at present when its hydrogen content drops only a few per cent.

"Such brightening of the sun will necessarily lead to the melting of the earth and, of course, to the disappearance of life," he stated in a recent lecture.

This then, at the present time, is the best concept of the end of the world. But before alarms need be raised by present occupants of the earth it should be added that while the sun may be getting hotter it is doing so most slowly as measured by man's calendar. Scientists suspect that there has been no observable climatic change in historical time due to an increase in the luminosity of the sun. Hence the end of the world, from this cause at any rate, is millions upon millions of years in the future.

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ASTRONOMY

"Poor Man's Platinum," For Telescope Mirrors

WHITISH metallic rhodium, often called the poor man's platinum because it is widely used for low-cost jewelry and such humble items as collar buttons, may soon be destined for the more lofty role of coating great telescope mirrors and gathering star light from the outermost depths of space.

Studies at the National Bureau of Standards by Dr. W. W. Coblentz and Ralph Stair show that rhodium has several special properties which make it desirable as a surfacing material for telescope mirrors.

Standard mirror coating for many years has been silver, but recently scientists have sought to avoid the serious and annoying blackening of the silver through oxidation. This has meant the resilvering of some telescope mirrors every month.

Rhodium's application by electrolytic action is a standard commercial process today and one that can be done at low cost.

Rhodium's reflectivity, as measured by Dr. Coblentz and Mr. Stair, is superior to chromium in the visible region of the spectrum but not quite so good in the ultraviolet. Silver is very good in the visible but very poor in the ultraviolet wavelengths.

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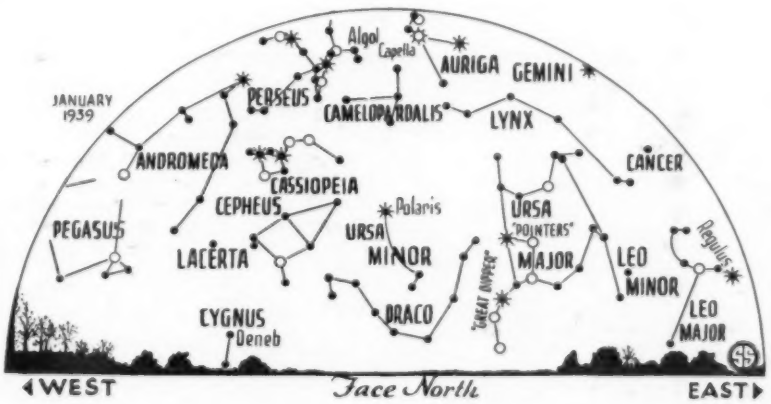
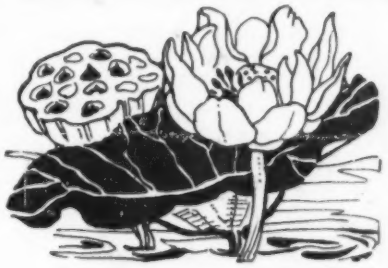


BOTANY

NATURE RAMBLINGS
by Frank Thone



Improper Names

A ROSE by any other name would smell as sweet, we have been assured by generation after generation of Shakespeare-quoters. Doubtless; but it would cause no end of confusion and perhaps some annoyance if some people should insist upon calling it a thorn-buttercup or a shrub-strawberry. Yet that is no worse than we do with many fine flowers that are entitled to honest names of their own.

Miss Alice Early Hyde calls attention to some of these improper names of our native plants, in *Wild Flower,* the official publication of the Wild Flower Preservation Society.

Misapplication of the name, grass, is particularly and annoyingly frequent, Miss Hyde points out. Thus, we have blue-eyed grass, which is a member of the iris family; yellow star grass, which is an amaryllis; grass of Parnassus, a saxifrage; Whitlow grass, a crucifer; poverty grass, belonging to the rockrose family.

And that word rockrose brings up some more improper names. For though some of the rockroses grow among rocks none of them are roses. And though the tuberose has tubers it isn't a rose, either. And the rose mallow is a mallow and not a rose. Nor is rosemary a rose, nor are rose geranium, rose bay, rose of Sharon and guelder rose at all closely related to the rose family.

Lilies also have alien plants thrust upon them under lily aliases. The calla lily is a cousin of Jack-in-the-pulpit, and the water lily is much more nearly akin to the magnolias and buttercups than it is to lilies. Also, a lovely little plant that is a true member of the lily family is compelled to masquerade under the wholly misleading name of dogtooth violet.

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•First Glances at New Books

History

THE GIRL WHO RULED A KINGDOM —Charlotte Kellogg—*Appleton-Century,* 154 p., $2. The story of Hungarian Princess Jadwiga who became Queen of Poland, told in the colorful fashion that such fourteenth century romance would require, for young readers. Mrs. Kellogg is already known for her biography of this same young heroine of history, written for adults.

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Hygiene

How TO LIVE (20th ed.)—Irving Fisher and Haven Emerson—*Funk & Wagnalls,* 422 p., $2.50. Practical sound advice, given by eminent authorities and written in plain, simple English, makes this an extremely helpful book for adults who want to know how to keep healthy. This edition has been completely revised and rewritten to bring it up-to-date.

Science News Letter, December 31, 1938

Photography

$50 A WEEK WITH CAR AND CAMERA —Paul Glenn Holt and H. Rossiter Snyder—*Fomo Pub. Co.,* 43 p., 50c. Mr. Holt describes his plan for making money by taking pictures and printing them as ordered.

Science News Letter, December 31, 1938

Anthropology

THE "RAIN BIRD", A STUDY IN PUEBLO DESIGN—H. P. Mera—*Laboratory of Anthropology, Santa Fé, N. M.,* 113 p., illus., $3.50. Traces the evolution and spread of one of the very popular motifs in Southwest Indian art. Some of the variations bear little resemblance to ancestral patterns.

Science News Letter, December 31, 1938

Education

A SURVEY OF COURSES OF STUDY AND OTHER CURRICULUM MATERIALS PUBLISHED SINCE 1934—Bernice E. Leary—*Govt. Print. Off.,* 185 p., 20 c.

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Hygiene

HEALTH, HYGIENE AND HOOEY—W. W. Bauer—*Bobbs Merrill,* 322 p., $2.50. This author attacks the double job of giving health advice and debunking health and food fads and fallacies in the best possible way—by applying humor and common sense. It would be a fine thing if these qualities of Dr. Bauer's were as "catching" as measles and the whole population could be exposed to them, thereby becoming immune to the fads, fallacies and worse promoted in the name of health. It is interesting to note that Dr. Bauer includes in this Book on Health, Hygiene and Hooey a chapter on the present controversy over medical economics and health insurance. The subject is presented from a viewpoint that is not very popular these days, but the reader who wants to be intelligent about his health will want to be intelligent about this aspect of health, too, by giving fair consideration to both sides of the controversy before forming opinions.

Science News Letter, December 31, 1938

Anthropology

SON OF OLD MAN HAT: A NAVAJO AUTOBIOGRAPHY—Recorded by Walter Dyk—*Harcourt,* 378 p., $3.50. Life in America as experienced by an Indian in the Southwest is unfamiliar to most Americans. Walter Dyk, fellow of the National Research Council, has set down this case-history of a Navajo, as told to him, with all its revealing details of psychology and custom.

Science News Letter, December 31, 1938

History

WORDS ON WINGS: THE STORY OF COMMUNICATION—Lillian J. Bragdon—*Farrar & Rinehart,* 156 p., illus., $1.75. A somewhat sketchy account (for children) of alphabetic writing, story telling, road building, bells, boats, the printing press, telephones, and various other human inventions, including four pages on aviation and a paragraph on television.

Science News Letter, December 31, 1938

Hygiene

HAVE YOU HAD YOUR VITAMINS—Harry N. Holmes—*Farrar & Rinehart,* 60 p., $1. This small book not only tells you what vitamins you need and why and where to get them but also gives a surprising amount of information on the discovery of the vitamins and their chemistry. Yet these technical matters are told so simply and entertainingly that the reader absorbs them easily and enjoyably.

Science News Letter, December 31, 1938

Chemistry

LABORATORY UNITS IN CHEMISTRY: MANUAL AND STUDY GUIDE FOR CHEMISTRY AT WORK—William McPherson, William Edwards Henderson and George Winegar Fowler—*Ginn,* 329 p., 80 c. A laboratory manual for a widely used college chemistry text.

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Medicine

INSOMNIA: ITS CAUSES AND TREATMENT —John A. P. Millet—*Greenberg,* 195 p., $1.75. A simply written book for the lay reader on a subject which is bound to interest, whether or not the reader suffers from insomnia, and which may help to prevent or relieve the condition by taking the mystery out of insomnia.

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Geography

CONCORDIA & CULTURE IN MANCHOUKUO—Publicity Section of the Manchou-Tikuo Concordia Assn., ed. and comp. —*Manchuria Daily News,* 84 p., illus., $2.50. Japanese enthusiasm to present Manchoukuo as the scene of great cultural progress shines from every page of this brochure.

Science News Letter, December 31, 1938

Archaeology

THE DIRECT-HISTORICAL APPROACH IN PAWNEE ARCHAEOLOGY—Waldo R. Wedel —*Smithsonian,* 21 p., six plates, 20 c.

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Medicine

MEDICAL OCCUPATIONS AVAILABLE TO BOYS WHEN THEY GROW UP—Lee M. Klinefelter—*Dutton,* 287 p., illus., $2. This should be an extremely interesting and helpful book for high school boys who are beginning to plan their futures, and for their parents as well. Information is given in both text and tables on the necessary preparation and annual cost of education in various medical occupations, and on the approximate number of men in each occupation, their average income and the future prospects. In the book, Joe, a typical high school boy, gets his information by interviewing men in each occupation and watching them at their work. There is no chapter on public health; perhaps the author plans a separate volume on this.

Science News Letter, December 31, 1938

Bacteriology

BACTERIOLOGY FOR STUDENTS IN GENERAL AND HOUSEHOLD SCIENCE (4th ed.) Estelle D. Buchanan and Robert Earle Buchanan—*Macmillan,* 548 p., $3.50.

Science News Letter, December 31, 1938

Hygiene

THE ADOLESCENT PERIOD, A GRAPHIC AND PICTORIAL ATLAS—Frank K. Shuttleworth—*Soc. for Research in Child Development, National Res. Coun.,* 246 p., $2. Valuable for scientific workers and educators but too technical for lay reading.

Science News Letter, December 31, 1938